



TerraSAR-X image of the month - Tents in the desert

03 November 2011

Viewed from above, the US 'Burning Man' festival resembles a spider web. The structure laid out on the site for this festival looks very much like a small town. In October and September 2011, the TerraSAR-X radar satellite, operated by the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR), acquired some impressive images of the festival and its setup process.

Seen from space, the plots in the campsite, intersected by roads and footpaths, can be discerned particularly well. DLR researchers are observing planet Earth with the radar satellite TerraSAR-X. "One of the unique capabilities of TerraSAR-X is to reveal changes on the Earth's surface that occur over an extended period of time," explains Mission Manager Stefan Buckreuz from the DLR Microwaves and Radar Institute. From these images it is possible to identify how 'Tent City' arose in a semicircle around its central point. Every 11 days at 06:57 local time, TerraSAR-X was able to observe the festival from exactly the same viewing angle. To make this possible, the satellite orbits Earth at an altitude of 515 kilometres in a Sun-synchronous dusk/dawn orbit, causing it to cross the Equator at almost a right angle. Earth continues to rotate beneath it, meaning that the satellite is able to scan its entire surface every 11 days.

Small details despite great altitude

Despite the great altitude of its orbit, the satellite is even able to identify individual cars. "Artificial structures such as tents and vehicles present themselves almost at right angles to the radar, which means that they reflect the signal straight back to the satellite," explains Buckreuz. They are easily identifiable in an otherwise natural environment. "We have also coloured them, so that they can be seen well," explains the Mission Manager – referring to the red and yellow dots in the image. The white areas are part of the neighbouring mountains, which reflect a particularly high proportion of the radar signals back to the satellite. In contrast, flat ground only reflects a very small proportion of the signal, so it appears as dark grey; the majority of the signal is diffusely scattered. Smooth, man-made structures such as roads reflect radar signals away from the satellite and appear black in the image.

'Burning Man' is no ordinary festival. There are no large stages, nor are there any big bands; nevertheless, it is extremely popular. More than 50,000 people gather in the Nevada desert over the course of the six days in early September when it is held. Every year, they establish themselves in a new location to seek freedom and self-reliance. Nevada's dry Black Rock Desert comes to life some weeks before the actual start of the festival. It ends with the burning of a larger-than-life effigy made of wood and straw, from which the festival gets its name.

The TerraSAR-X mission

TerraSAR-X is the first German satellite manufactured under what is known as a Public-Private Partnership between the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) and Astrium GmbH in Friedrichshafen. The satellite travels around the Earth in a polar orbit and records unique, high-quality X-band radar data about the entire planet using its active antenna. TerraSAR-X works regardless of weather conditions, cloud cover or the absence of daylight and is able to provide radar data with a resolution down to one metre.

DLR is responsible for using TerraSAR-X data for scientific purposes. It is also responsible for planning and implementing the mission as well as controlling the satellite. Astrium built the satellite and shares the costs of developing and using it. Infoterra GmbH, a subsidiary company

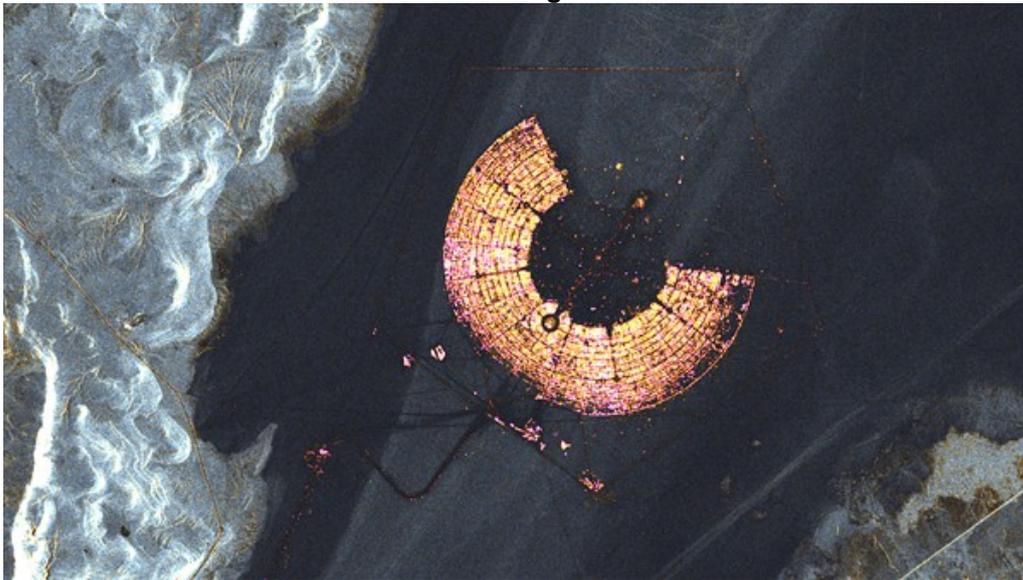
founded specifically for this purpose by Astrium, is responsible for marketing the data commercially.

Contacts

Manuela Braun
German Aerospace Center (DLR)
Media Relations, Space Research
Tel.: +49 2203 601-3882
Fax: +49 2203 601-3249
Manuela.Braun@dlr.de

Dr.-Ing. Stefan Buckreuß
German Aerospace Center (DLR), DLR Microwaves and Radar Institute
Tel.: +49 8153 28-2344
Fax: +49 8153 28-1449
Stefan.Buckreuss@dlr.de

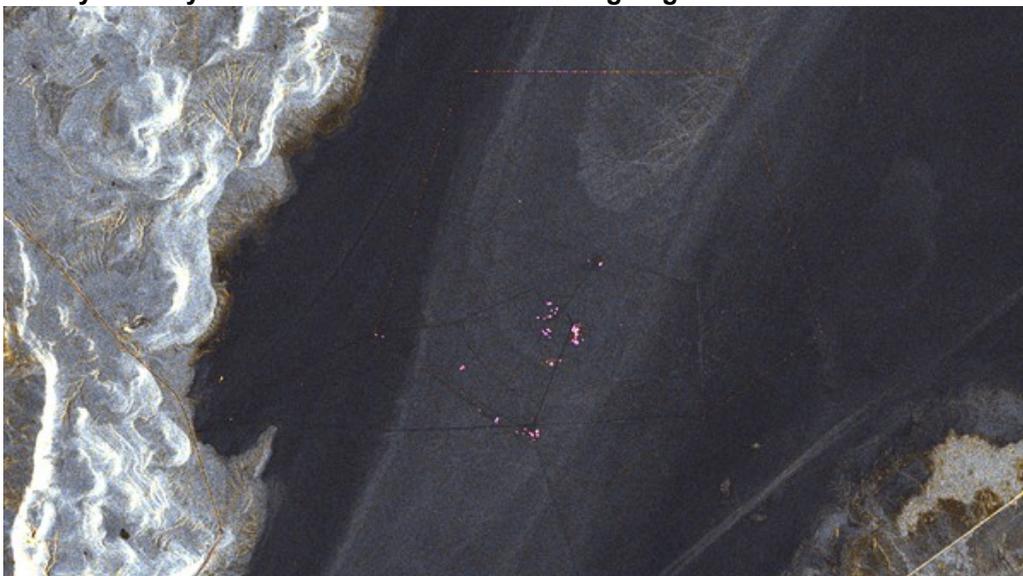
The desert lives – the festival is in full swing!



The tents and vehicles are clearly visible in this radar image. The artificial structures have been coloured to make them more easily visible; the actual radar image is black and white.

Credit: DLR (CC-BY 3.0).

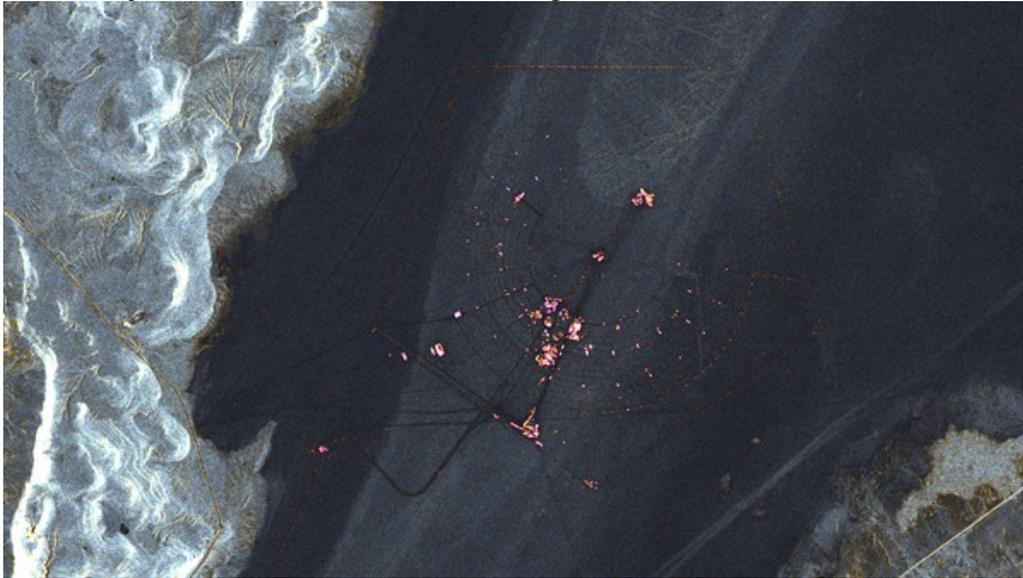
Twenty-two days before the festival – not much going on ...



Black Rock Desert looks fairly desolate just 22 days before the festival. Black Rock Desert, a good three weeks before 'Burning Man'. Man-made trails on the festival grounds are clearly visible; they appear darker than the undisturbed soil.

Credit: DLR (CC-BY 3.0).

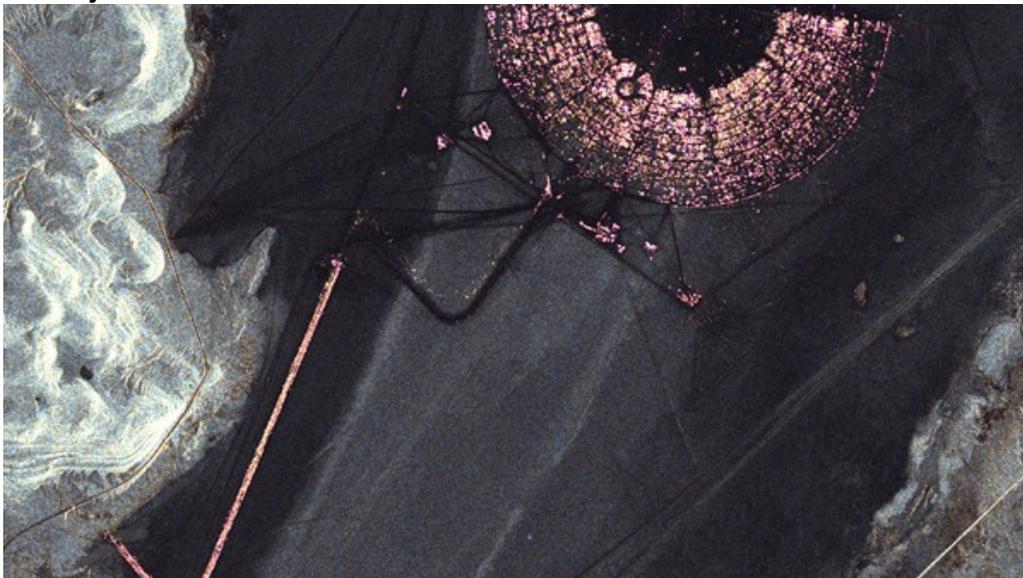
Eleven days before the festival – the first signs of civilisation



A number of vehicles and structures are already visible a few days before the start of the festival. The time interval between image acquisitions makes changes on Earth's surface apparent.

Credit: DLR (CC-BY 3.0).

Traffic jam in the desert



Traffic jam on the main access road; artificial structures reflect back a large proportion of the radar signals and are therefore easy to distinguish.

Credit: DLR (CC-BY 3.0).

The festival from above – order among chaos



From above, this town of tents resembles a giant spider web. Details of the festival area can be seen in this image, also acquired by satellite. Chaos dominates each of the plots, but the roads between them are kept clear.

Credit: Geoeye.

Contact details for image and video enquiries as well as information regarding DLR's terms of use can be found on the DLR portal imprint.